# CHAPTER 3
# PLANNING CONSIDERATIONS FOR UXO SUPPORT

3-1. Introduction. This chapter discusses the requirements that should be addressed prior to initiating UXO support activities during HTRW and construction activities on sites with known or suspected UXO. The objective of UXO support activities is to conduct safe and efficient operations while limiting potential exposure to a minimum number of personnel for a minimum time and to the minimum amount of UXO.

3-2. Planning Documents. Site-specific planning documents should be prepared that will detail the methodologies that will be used during the UXO support project. For anomaly avoidance activities, the planning document is the HTRW Work Plan. For construction activities, the planning documents include the Work Plan and the ESS (if required). For range construction projects, the planning documents include Plans and Specifications. The planning documents should be prepared in accordance with the project SOW and contract requirements. The project team should ensure that these documents are consistent with each other.

3-3. Work Plan.

a. For anomaly avoidance and construction activities, a Work Plan to supplement the prime contractor's or USACE work plan/site plan will be prepared. The Work Plan should be prepared in accordance with the project SOW and contract requirements.

b. Content. The Work Plan does not need to be comprehensive, as it is a supplement to the overall site Work Plan. The Work Plan should detail the management approach and operational procedures that will be used to complete the UXO support activity. The Work Plan should include a SSHP which specifically addresses UXO considerations. The Work Plan should indicate the specific geophysical instrument the UXO team intends to use.

c. The Work Plan should be submitted by the contractor to the PM for review and comment. The PM will then forward one copy to the OE MCX. The OE MCX will review and provide comments and written concurrence or nonconcurrence on the planning documents containing UXO support provisions. The OE MCX will be allocated 15 calendar days from date of receipt for this review. If no comments are received from the OE MCX within this time frame, concurrence may be assumed by the executing agency.

d. The accepted Work Plan will serve as the contractual basis for all subsequent project activities. Current copies of the Work Plan will be kept for reference by the PM, the contractor's senior site representative and safety manager, and the UXO team. The accepted Work Plan will be maintained in the district office.

e. Modifications. Changes may be required to the Work Plan and/or SSHP after approval by the Contracting Officer. A modification that affects any UXO subsurface clearance operational and/or safety procedures may also require a revision to and re-submittal of the Explosives Siting Plan.

3-4. Explosives Siting Plan.

a. General.

(1) An Explosives Siting Plan (ESP), a component of the Work Plan, is prepared for UXO support during construction activities. The ESP discusses the proposed minimum separation distances for unintentional detonations, intentional detonations, and siting of critical project components. The ESP should describe the basis of design, all design calculations, and proposed hazard mitigation measures to be implemented to protect the public, non-project personnel, and site workers from explosive hazards. The ESP will be reviewed by the project team to ensure that the appropriate minimum separation distance criteria have been applied.

(2) The ESP will discuss the following explosives operations: OE areas, explosives storage magazines, and planned or established demolition areas. The location of these explosives operations will be sited on a map with a minimum scale of 1 inch equals 400 feet. The minimum separation distances calculated for the operation should be discussed in the text of the plan and Quantity-Distance (Q-D) arcs for the above-listed project elements drawn on the map.

(3) Quantity-Distance. Explosives safety distance tables prescribe the necessary separations and specify the maximum quantities for various classes of explosives permitted in any one location. The Q-D tables provided in DOD 6055.9-STD, DOD Ammunition and Explosives Standards, reflect the acceptable minimum criteria for the storage and handling of various classes and amounts of explosives. These distances will be used for siting storage locations. The project should site Open Burn/Open Detonation (OB/OD) areas in accordance with EP 1110-1-17, Establishing a Temporary Open Burn and Open Detonation Site for Conventional Ordnance and Explosives Projects.

b. OE Areas. During intrusive operations, safe separation distances will be determined using two sets of minimum separation distance criteria. The first set of criteria has been established for unintentional detonations (i.e., not planned in advance) and the second set of criteria has been established for intentional detonations (i.e., planned, controlled detonations). Details on calculating minimum separation distances are published in Engineer Manual (EM) 1110-1-4009, Ordnance and Explosives Response.

(1) Unintentional detonations. For an unintentional detonation, the applicable minimum separation distances are the minimum separation distances for unintentional detonations and the team separation distance (TSD). The minimum separation distance for unintentional detonations

is the safe separation distance for non-project personnel from intrusive operations. The TSD is the distance that UXO teams must be separated during intrusive operations.

(2) Intentional Detonations. The minimum separation distance for intentional detonations is the distance that both project personnel and the public must be from the intentional detonation.

c. Explosives Storage Magazines.

(1) The ESP should provide the following information on explosives storage magazines:

(a) Type(s) of magazines used (e.g., Bureau of Alcohol, Tobacco and Firearms Classification [Type 1-5], portable commercial, above ground, shed, earth covered, etc.).

(b) Net Explosive Weight (NEW) and hazard division to be stored in each magazine. Generally, recovered OE is considered Hazard Division (HD) 1.1.

(c) Q-D criteria used to site the magazine.

(d) Design criteria for any proposed engineering controls to be used to mitigate exposures to the public when Q-D criteria cannot be met.

(2) Magazines must also be properly placarded and the property must be secured. DOD magazines storing commercial explosives must have the appropriate fire fighting symbol or locally required DOD Hazard Classification and Storage Compatibility Group assigned.

d. Planned or Established Demolition Areas. The safe separation distance for these areas will be based on the minimum separation distance criteria for intentional detonations.

e. Footprint Areas. The following footprint areas should be discussed in the ESP: blow-in-place, collection points, and in-grid consolidated shots. These areas, however, do not have to be shown on the site map. The safe separation distances for these footprint areas are described in the following paragraphs.

(1) Blow-in-Place. Blow-in-place is the preferred method for disposal of UXO. Blow-in-place occurs when a UXO item is prepared and detonated in-place. The safe separation distances for blow-in-place areas will be determined using the minimum separation distance criteria for intentional detonations.

(2) Collection Points. Collection points are areas where recovered UXO that is safe to move is temporarily accumulated within a search grid pending relocation to another area for storage or destruction. Collection points should be limited to the amount of explosives such that the K50 total of the rounds to be destroyed will not exceed safe separation distances. The safe

separation distances for collection points will be determined using the minimum separation distance criteria for unintentional detonations.

(3) In-Grid Consolidated Shots. In-grid consolidated shots occur when recovered UXO that is safe to relocate is collected and destroyed within a search grid. In contrast to an established demolition ground, consolidated shots occur within a search grid rather than in a separate area. The procedures for in-grid consolidated shots are presented in the USAESCH document "Procedures for Demolition of Multiple Rounds (Consolidated Shots) on Ordnance and Explosives (OE) Sites", dated August 1998. USAESCH documents are available on the OE MCX website at http://www.hnd.usace.army.mil/oew.

f. Exceptions. The calculated minimum separation distances for unintentional detonations specified above are considered minimums for safe execution of normal operations. When site conditions exist that make it impossible or impractical to comply with these minimums, the PM may request consideration of a possible reduction. Any request for a reduction of these minimum separation distances will be funded and staffed through the Huntsville Center's Engineering Directorate, Structural Branch for calculations and the Huntsville Center's OE Safety Group for approval. For any requested reduction to the specified minimum separation distances for unintentional detonations, a detailed risk analysis must be documented explaining why these reductions are necessary and acceptable.

3-5. Explosives Safety Submission.

a. Construction activities involving the removal and disposition of UXO may require submittal and approval of an ESS. The requirement for an ESS will be determined on a case-by-case basis by the project team in consultation with the OE MCX. The purpose of the ESS is to ensure that all applicable DOD and Army regulations regarding safe and secure handling of ordnance are followed. Detailed information on the content, review and approval procedures, and modification process for the ESS is available in EP 1110-1-18.

b. UXO removal operations may not begin on construction projects requiring an ESS until the ESS is approved by the U.S. Army Technical Center for Explosives Safety (USATCES) or Department of Defense Explosives Safety Board (DDESB) and the contractor has been directed to incorporate the accepted ESS into the Work Plan. A copy of the accepted ESS will be maintained at the project site. All operations will be executed in accordance with the accepted ESS.

c. When an element of the accepted ESS changes, the ESS must be amended. The contractor will prepare the proposed change and forward it to the PM, who will forward it to the OE MCX for review. The OE MCX will forward the proposed changes to the appropriate agency for approval. For a change that specifies less restrictive requirements (e.g., reduction in exclusion zone), the contractor will comply with the accepted ESS until the change is approved.

When changes would be more restrictive (e.g., increase in exclusion zone), the contractor will apply the more restrictive measures until the ESS change is approved.

d. Once the ESS, Work Plan and all other prerequisite planning documents are accepted, a Notice-to-Proceed with the removal operations will be issued.

3-6. Personnel Qualifications and Work Standards. The OE MCX has set forth personnel standards applicable to all USACE OE Safety Specialists and UXO contractor personnel working for the USACE. These qualifications and standards detail the prerequisites for education and experience required for UXO personnel and are available on the OE MCX website at http://www.hnd.usace.army.mil/oew.

3-7. Training. USACE and contractor personnel will be in compliance with training requirements prior to conducting UXO support activities. Training requirements are published in EP 1110-1-18. The training topics included in EP 1110-1-18 pertain to 29 Code of Federal Regulations (CFR) 1910, 29 CFR 1926, cardiopulmonary resuscitation (CPR)/First Aid, Medical Surveillance, and Visitor Training.

3-8. Explosives Safety. There are no “safe” methods for dealing with UXO, merely procedures and process controls that are designed to reduce potential hazards. Maximum safety in any UXO response can be achieved through adherence to applicable safety precautions, a planned approach, and intensive supervision and UXO safety oversight. UXO qualified personnel will conduct a UXO-related site safety briefing prior to commencing operational activities each workday. All activities with potential exposure to ordnance and explosives will be reviewed to identify the associated risks and proposed mitigation procedures. Operations within areas suspected of containing UXO must be conducted in a manner that exposes the minimum number of people to the smallest quantity of explosives for the shortest period of time. During UXO subsurface clearance actions, all non-essential project personnel will withdraw to a location outside of the exclusion zone.

a. General Safety Considerations. General safety considerations applicable to personnel, both essential and non-essential, at project sites where UXO may be encountered include:

(1) Do not carry fire or spark-producing devices.

(2) Do not conduct explosive or explosive-related operations without approved procedures and proper supervision and UXO safety support.

(3) Do not become careless by reason of familiarity with UXO or the reported probability level of UXO contamination.

(4) Do not conduct explosive or potentially explosive operations during inclement weather.

(5) Avoid contact with UXO except during UXO clearance conducted during construction activities.

(6) Conduct UXO-related operations during daylight hours only.

(7) Employ the “buddy system” at all times.

b. Hazard Analysis.

(1) Hazard analyses will be conducted by personnel that are knowledgeable in UXO and explosives safety standards and requirements. These personnel should understand the specific operational requirement and hazard analysis methodologies. A hazard analysis will be performed for each activity to determine the significance of any potential explosive-related hazards. For example, residual explosives from ordnance fillers may be exposed during an HTRW sampling activity. Explosive residues may be in the form of powder or various granular and powder based pellets. These contaminants can enter the body through the skin or by ingestion if proper personal hygiene practices are not followed. Explosive fillers such as white phosphorus are dangerously reactive in air and acute exposure can result in serious injury to the skin, eyes, and mucous membranes. They are also a fire hazard.

(2) Safety requirements (or alternatives) that will either eliminate the identified hazards or control them to reduce the associated risks to an acceptable level will be developed. The adequacy of the operational and support procedures that will be implemented to eliminate, control, or abate identified hazards or risks will then be evaluated and a second risk assessment completed to verify that a satisfactory safety level has been achieved.

c. Hazards of Electromagnetic Radiation to Ordnance (HERO).

(1) Some ordnance items and other electroexplosive devices (EEDs) are particularly susceptible to electromagnetic radiation (EMR) in the radio frequency range (RF) originating from devices such as radio, radar, and television transmitters. The presence of antennas, communication and radar devices should be noted on initial site visits and/or preliminary assessments of eligibility. In addition, active and passive subsurface detection devices emit EMR/RF. Each type of equipment producing EMR/RF must be reviewed and a hazard analysis completed. The level of EMR/RF susceptibility and potential hazard is a result of the design and type of ordnance item or EED that may be present. Therefore, a knowledge of what ordnance is normally unsafe in the presence of EMR/RF is important so preventive steps can be taken if the ordnance is encountered. The OE MCX should be consulted when geophysical investigations are planned in areas potentially containing electric-fuzed ordnance.

(2) As part of the hazard analysis, the minimum separation distance between an EMR/RF emitting device and potential EEDs will be calculated. This calculation is based on the

characteristics of the transmitting device and the potential EEDs. The important characteristics of the EMR/RF source device are:

(a) The transmitter frequency (f, in MHz).

(b) The peak envelope transmitting power (Pt, in W).

(c) The transmitter gain (GdB).

(3) Minimum safe distances from EMR/RF sources are listed in Tables 2-2, 2-3, and 2-4 of Technical Manual (TM) 9-1375-213-12, Operator's and Organizational Maintenance Manual, Demolition Materials.

3-9. Personal Protective Equipment.

a. All UXO team members should be trained in the use of, medically qualified for, and physically able to wear, the prescribed PPE. PPE for UXO support operations will be determined by site-specific and task-specific analyses, documented in the site-specific SSHP, and worn as indicated in the plans. Specific requirements for PPE are described in the following paragraphs.

(1) PPE will comply with the more stringent requirements of EM 385-1-1, USACE Safety and Health Requirements Manual, and the applicable portions of 29 CFR 1910 Subpart I or 29 CFR 1926 Subpart E.

(2) Footwear. In addition to the applicable requirements in the references cited above, shoes or boots with high traction soles and ankle protection will be used. During geophysical detection activities, UXO support personnel will not wear safety shoes or other footwear that would cause interference with instrument operations.

(3) Clothing. Short sleeve shirts and long pants are considered the minimum clothing suitable for UXO support work and will be worn at all work sites, unless variations are described, analyzed and documented in the accepted SSHP.

(4) Head Protection. Personnel working in or visiting designated hard hat areas will be required to wear head protection meeting American National Standards Institute (ANSI) Z89.1 standards. Hard hat areas for UXO support activities should not be designated unless the activity hazard analysis shows a possible overhead hazard.

b. UXO support personnel using PPE will be knowledgeable of the limitations of the selected PPE as well as the reduced performance levels the equipment might pose while conducting assigned tasks.

3-10. Fire Prevention.

a. Fire prevention awareness is especially important in areas suspected of being contaminated with UXO. Smoking should only be permitted in controlled areas where all combustibles (e.g., vegetation, fuel cans, sampling supplies) have been removed or sufficient firebreaks have been established. Personnel may attempt to extinguish minor fires with fire extinguishers if they are trained to do so safely without endangering themselves or others within the vicinity of the fire.

b. If a fire becomes uncontrollable or extends into areas with unknown UXO contamination, all personnel must immediately suspend any fire fighting efforts and retreat to a safe distance, which is at least the maximum fragment distance of the most probable munition (MPM). Personnel should retreat upwind of the fire. The senior UXO qualified person present should then lead an immediate evacuation of the area using available resources to ensure the safety of all personnel.

3-11. Emergency Procedures. UXO support activities may result in accidents or incidents, regardless of the safeguards implemented. The SSHP will describe site-specific emergency response procedures, including identification of all appropriate POCs. All personnel must be briefed on the emergency response procedures and protocols discussed in the SSHP.

a. Emergency Response. In the event of a UXO-related emergency on-site during anomaly avoidance, the senior UXO qualified person present will direct the course of action until the local POC designated in the Work Plan has been notified. In the event of a UXO-related emergency on-site during construction support, the Senior UXO Supervisor (SUXOS) will direct the course of action until the local POC designated in the Work Plan has been notified. It may be necessary for other on-site personnel to provide assistance. If an emergency response rescue operation is required, no one will reenter the accident area until the hazards of the situation have been assessed by the responsible person (see above), and all required resources are on-hand to complete the rescue without jeopardizing the safety of rescue personnel.

b. Emergency Rescue.

(1) The senior UXO qualified person or the local POC, as applicable, will direct any UXO-related emergency response rescue operation. Response considerations include the following elements:

(a) Designation of an emergency response vehicle(s) to remain on-site during rescue operations.

(b) Determination of existing hazards, as well as the potential for additional hazards.

(c) Coordination with USACE in the review of the need to alert the local community.

(d) Assessment of the situation and condition of any victims.

(e) Determination of the resources needed for victim stabilization and transport and additional emergency support.

(f) Enforcement of the Buddy System. No one will be permitted to enter a rescue area alone.

(g) Oversight of the removal of injured personnel from the area.

(h) Consultation with on-site safety officers to establish decontamination protocols. Decontamination of injured parties will be accomplished after stabilization of their medical conditions. This action need not be accomplished if their condition poses immediate threat to the victim's life or may cause additional injury. If contamination is suspected, the victim will be wrapped in material to prevent the spread of contamination during extrication and transport. Emergency medical personnel will be advised on potential injuries, as well as potential contamination, of the patient as early as possible. The patient will not be transported to a medical facility without prior notification of, and coordination with, the receiving facility regarding potential contamination.

c. Mishap Reporting and Investigation Requirements. The following information provides guidelines to be followed for reporting mishaps involving ammunition and explosives on UXO support projects. Site-specific reporting and investigation procedures, including identification of appropriate POCs, will be included in the SSHP.

(1) Reporting Requirements. All mishaps will be investigated by the contractor and reported to the Contracting Officer and OE Safety Specialist or to the government authority cited in the SOW. Notification and reporting of mishaps will be in accordance with USACE Supplement to Army Regulation (AR) 385-40, USAESCH Safety Concepts and Basic Considerations for UXO Operations, and EM 385-1-1. Any mishap will be reported on ENG FORM 3394, Accident Investigation Report.

(a) For anomaly avoidance and safety support projects on Formerly Used Defense Sites (FUDS), the senior UXO-qualified person on-site is responsible for mishap reporting. For subsurface clearance projects in support of construction activities at FUDS, the contractor’s UXO Safety Officer (UXOSO) is responsible for mishap reporting. For contracts under the supervision of the district, mishaps will be reported to the district safety office. An information copy of the accident report will be forwarded to the OE MCX. USACE district personnel will report through Command channels to the HQUSACE Safety and Occupational Health Office.

(b) On active installations, the installation safety officer is responsible for reporting any explosive mishaps.

(c) Non-Stockpile Chemical Warfare Materiel (CWM) Incidents. Incidents involving CWM will be reported in accordance with USACE Supplement to AR 385-40. A site-specific POC will be identified and documented in accordance with the reporting requirements in paragraph 3-11c(1).

(2) Investigation Requirements. In the event of a mishap, the contractor will implement emergency procedures and secure the scene to keep unauthorized persons away for their protection and to preserve the evidence for subsequent mishap investigation. On active installations, the U.S. Army Safety Center (USASC) maintains the prerogative to investigate Class A or Class B explosive mishaps (as defined in AR 385-40). If USASC chooses to investigate, it is the lead agency. If USASC chooses not to investigate, then the district is the lead agency.